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Effects of Tobacco Smoke on Cellular Respiration.

Grant #620R2

The objective is to investigate the effects of cigarette smoke inhalation upon cellular oxidative respiration in the lung. Guinea pigs are exposed to the Walton smoking machine under acute conditions of smoke exposure, and under chronic conditions that more nearly simulate human smoking parameters. While exposed, animals are confined with their noses plugged to induce smoke inhalation by mouth. The acute smoke exposure regimen produces a slight reduction of oxidative phosphorylation efficiency in lung mitochondria tested with either NAD-linked or FAD-linked substrate. However, animals that are sham exposed to the machine under conditions of confinement and nose closure uniformly show a reduction in phosphorylating efficiency by one P/O unit. Most of this reduction is reversed by inhaling smoke.

These preliminary results suggested that the stress of sham exposure may be partially alleviated in the animals exposed to smoke under acute conditions. In further studies we have identified the patterns of phosphorylative coupling at several different sites in the respiratory chain. The phosphorylation pattern of stressed animals differs from that of smoking animals in terms of site specificity. Future studies will concentrate on more prolonged chronic exposures and will include some histochemical and morphological studies.

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